# TC-1U27FX8

# 1U Flex ATX Power Supply

**( 1 U  F l e x 270W 8 0 P L U S )**

# SPECIFICATION

**Revision: 1.0**

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## 1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model TC-1U27FX8 ; AC-line powered switching power supply with active PFC (Power Factor Correction) circuit, meet EN61000-3-2 and with Full Range Input features.

The specification below is intended to describe as detailedly as possible the functions and performance of the subject power supply. Any comment or additional requirements to this specification from our customers will be highly appreciated and treated as a new target for us to approach.

## 2. REFERENCE DOCUMENTS

The subject power supply will meet the EMI requirements and obtain main safety approvals as following:

2.1 EMI REGULATORY

- FCC Part 15 Subpart J, Class “B”115 Vac operation.
- CISPR 22 Class”B”230 Vac operation.

2.2 SAFETY

- NEMKO EN 60950-1
- TUV EN60950
- CSA 22.2 NO. 60950-1
- IEC 60950-1
- UL 60950-1
- CE

| | |
|---|---|
| EN 55022:1998+A1:2000,Class B | EN 55204:1998+A1:2001 |
| EN 6100-3-2:2000 | IEC 6100-4-2:2001 |
| EN 6100-3-3:1995+A1:2001 | IEC 6100-4-3:2002 |
| | IEC 6100-4-4:1995 |
| CISPR22:1997+A1:2000,Class B | +A1:2000+A2:2001 |
| AS/NZS CISPR 22:2002,Class B | IEC 6100-4-5:2001 |
| | IEC 6100-4-6:2001 |
| | IEC 6100-4-8:2001 |

## 3. PHYSICAL REQUIREMENTS

### 3.1 MECHANICAL SPECIFICATIONS

The mechanical drawing of the subject power supply, which indicate the form factor, location of the mounting holes, location, the length of the connectors, and other physical specifications of the subject power supply. Please refer to the attachment drawing.

### 3.2 CONNECTOR SPECIFICATIONS

The power supply connectors are:

AC Inlet : Standard inlet socket 10A/250V, UL/CSA/VDE approved.
P1 : The equivalent of MOLEX 39-01-2200, 24 pin connector
PA,PB,PC, : The equivalent of AMP 1-480424-0, 4 pin connector
PD :The equivalent of AMP 171822-4, 4 pin connector
P2 :The equivalent of Molex 39-01-2040, 4pin connector

### 3.3 CONNECTOR PIN DESIGNATIONS

The pin designations and color codes are defined as follows:

| | P1 SYSTEM BOARD | | PD DISK DRIVER | | PA,PB,PC DISK DRIVER | | P2 DISK DRIVER | |
|---|---|---|---|---|---|---|---|---|
| PIN1 | +3.3V | ORANGE | +12V2 | YELLOW | +12V2 | YELLOW | COM | BLACK |
| PIN2 | +3.3V | ORANGE | COM | BLACK | COM | BLACK | COM | BLACK |
| PIN3 | COM | BLACK | COM | BLACK | COM | BLACK | +12V1 | YELLOW/BLACK |
| PIN4 | +5V | RED | +5V | RED | +5V | RED | +12V1 | YELLOW/BLACK |
| PIN5 | COM | BLACK | | | | | | |
| PIN6 | +5V | RED | | | | | | |
| PIN7 | COM | BLACK | | | | | | |
| PIN8 | PWR- OK | GRAY | | | | | | |
| PIN9 | +5VSB | PURPLE | | | | | | |
| PIN10 | +12V2 | YELLOW | | | | | | |
| PIN11 | +12V2 | YELLOW | | | | | | |
| PIN12 | +3.3V | ORANGE | | | | | | |
| PIN13 | +3.3V | ORANGE | | | | | | |
| | +3.3VS | BROWN | | | | | | |
| PIN14 | -12V | BLUE | | | | | | |
| PIN15 | COM | BLACK | | | | | | |
| PIN16 | PS_ON | GREEN | | | | | | |
| PIN17 | COM | BLACK | | | | | | |
| PIN18 | COM | BLACK | | | | | | |
| PIN19 | COM | BLACK | | | | | | |
| PIN20 | NC | NC | | | | | | |
| PIN21 | +5V | RED | | | | | | |
| PIN22 | +5V | RED | | | | | | |
| PIN23 | +5V | RED | | | | | | |
| PIN24 | COM | BLACK | | | | | | |

## 4. ELECTRICAL REQUIREMENTS

### 4.1 OUTPUT ELECTRICAL REQUIREMENTS

The subject power supply will meet all electrical specifications below, over the full operation temperature range and dynamic load regulation.

#### 4.1.1. OUTPUT RATING

| Output | Nominal | Regulation | Ripple/Noise | Min | Max | peak |
|---|---|---|---|---|---|---|
| 1 | +3.3V | ±5% | 50mV | 0.5A | 16.0 A | |
| 2 | +5V | ±5% | 50mV | 0.5A | 18.0 A | |
| 3 | +12V1 | ±5% | 120mV | 1.0A | 16.0 A | |
| 4 | +12V2 | ±5% | 100mV | 1.0 A | 10.0 A | |
| 5 | -12V | ±10% | 120mV | 0 A | 0.8 A | |
| 6 | +5VSB | ±5% | 50mV | 0 A | 2.5A | |

(1) The +12V1 and +12V2 total output shall not exceed 18A.
(2) The +3.3V and +5V total output shall not exceed 130watts.
(3) total output for this subject power supply is 270 watts.
(4) Ripple and noise measurements shall be made under all specified load conditions through a single pole low pass filter with 20MHz cutoff frequency. Outputs shall bypassed at the connector with a 0.1uF ceramic disk capacitor and a 10uF electrolytic capacitor to simulate system loading.

#### 4.1.2. LOAD CAPACITY SPECIFICATIONS

The cross regulation defined as follows, the voltage regulation limits DC include DC Output ripple & noise.

| LOAD | STM. | +3.3V | +5V | +12V1 | +12V2 | -12V |
|---|---|---|---|---|---|---|
| ALL MAX | HHHHH | 16.0A | 15.44A | 7.325A | 5.0A | 0.8A |
| +5V MAX other MIN | LHLLL | 0.5A | 18.0A | 4.5A | 4.5A | 0A |
| +3.3V MAX other MIN | HLLLL | 16.0 A | 0.5 A | 1.0A | 1.0A | 0.1A |
| +12V1 MAX other MIN | LLHLL | 0.5 A | 1.0A | 16.0A | 1.0A | 0.1A |
| +12V2 MAX other MIN | LLLHL | 0.5 A | 1.0 A | 1.0A | 10.0A | 0.1A |
| ALL MIN | LLLLL | 0.5 A | 0.5 A | 0.5A | 0.2A | 0A |

4.1.3. HOLD-UP TIME (@FULL LOAD)

(1)270W:
115V / 60Hz : 17 mSec. Minimum.
230V / 50Hz : 17 mSec. Minimum.

(2)300W:
115V / 60Hz : 13 mSec. Minimum.
230V / 50Hz : 13 mSec. Minimum.

The output voltage will remain within specification, in the event that the input power is removed or interrupted, for the duration of one cycle of the input frequency. The interruption may occur at any point in the AC voltage cycle. The power good signal shall remain high during this test.

4.1.4.OUTPUT RISE TIME

(10% TO 90% OF FINAL OUTPUT VALUE, @FULL LOAD)

115V-rms or 230V-rms + 5Vdc : 20ms Maximum

4.1.5.OVER VOLTAGE PROTECTION

| Voltage Source | Protection Point |
|---|---|
| + 3.3 $V_{dc}$ | 3.5V-4.8V |
| +5$V_{dc}$ | 5.5V-6.82V |
| +12$V_{1dc}$ +12$V_{2dc}$ | 13.4V-15.6V |

4.1.6.SHORT CIRCUIT PROTECTION

Output short circuit is defined to be a short circuit load of less than 0.1 ohm.

In the event of an output short circuit condition on +3.3V, +5V or +12V output, the power supply will shutdown and latch off without damage to the power supply. The power supply shall return to normal operation after the short circuit has been removed and the power switch has been turned off for no more than 2 seconds.

In the event of an output short circuit condition on –12V output, the power supply will not be damaged. The power supply shall return to normal operation as soon as the short circuit has been removed. and the power switch has been turned off for no more than 2 seconds.

4.1.7.OVERLOAD PROTECTION

Overload currents defined as a 10 amp/sec fault current ramp starting from full load, applied to the +3.3V, +5V output, shall not cause that output to exceed 45 amps before the output voltage drops below 0.5 volts and is latched off. The +12V1,+12V2 output shall not exceed 25 amps under the same ramp conditions starting at full load before it is latched off.

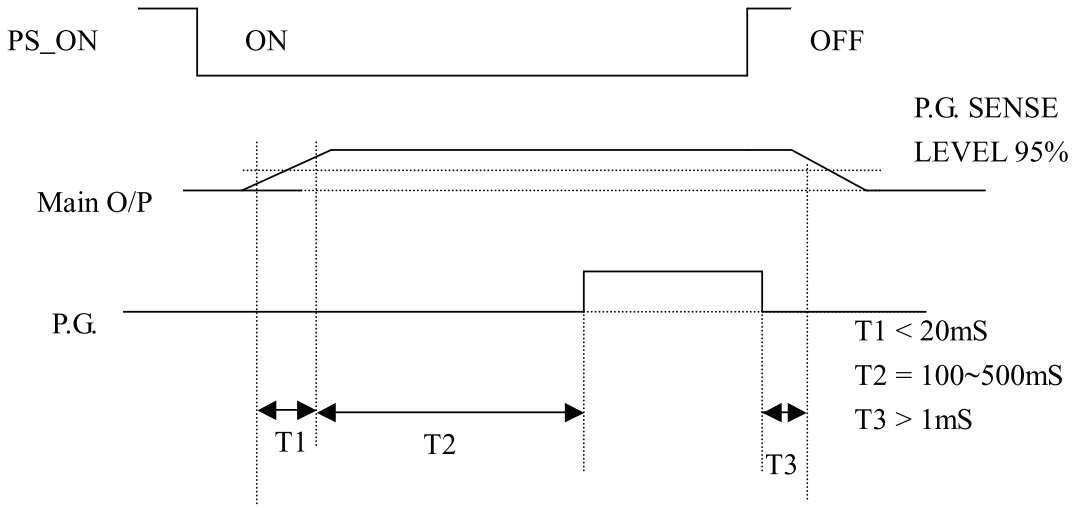
The overload protection must be such that the power supply is protected from damage by entering a shutdown condition.

4.1.8.POWER GOOD SIGNAL

The power good signal is a TTL compatible signal for the purpose of initiating an orderly star-up procedure under normal input operating conditions. This signal is asserted (low) until +5Vdc has reached 4.75 volts during power up. Characteristics:

TTL signal asserted (low state) : less than 0.5V while sinking 10mA.
TTL signal asserted (high state): greater than 4.75V while sourcing 500uA.
High state output impedance: less or equal to 1Kohm from output to common.

| | |
|---|---|
| POWER GOOD @ 115/230V,FULL LOAD | 100 –500mSec. |
| POWER FAIL @115/230V, FULL LOAD | 1 mSec. minimum |



4.2. OUTPUT TRANSIENT LOAD RESPONSE

+5V and +12V must be within specification for a step change in current as specified below. The outputs will be tested one section at a time with all other sections at maximum load. The test transition will be from IA to IB and IB to IA. The step current will have a nominal transition time of 0.5 amp per microsecond for +5V and 0.1 amp per microsecond for +12V.

**+5Vdc:**

| | |
|---|---|
| IA: | 18.0 amps |
| IB: | 12.0 amps |
| Volts variation: | 400 mV max (p-p) |
| Setting time: | 10 ms max |

**+12V1dc:**

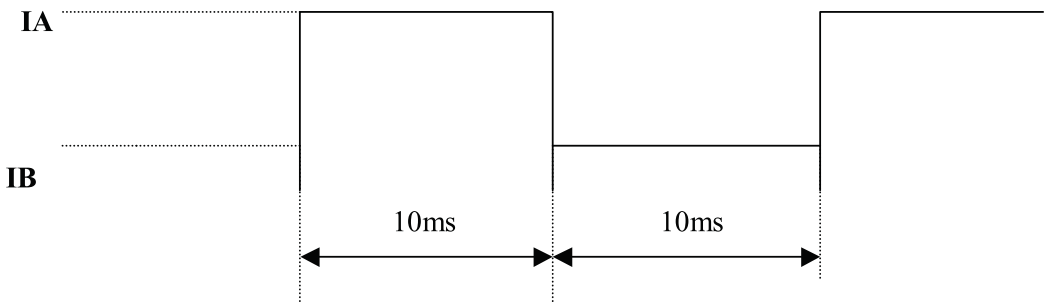
| | |
|---|---|
| IA: | 16.0 amps |
| IB: | 9.6 amps |
| Volts variation: | 450 mV max (p-p) |
| Setting time: | 10 ms max |

**+12V2dc:**

| | |
|---|---|
| IA: | 10.0 amps |
| IB: | 6.0 amps |
| Volts variation: | 450 mV max (p-p) |
| Setting time: | 10 ms max |

**+3.3Vdc:**

| | |
|---|---|
| IA: | 16.0 amps |
| IB: | 11.0 amps |
| Volts variation: | 400 mV max (p-p) |
| Setting time: | 10 ms max |



## 4.3. INPUT ELECTRICAL SPECIFICATIONS

### 4.3.1. VOLTAGE RANGE

| PARAMETER | | UNITS |
|---|---|---|
| V-in Range | 90 - 264 | V-rms |

### 4.3.2. INPUT FREQUENCY

| INPUT FREQUENCY | 47–63Hz |
|---|---|

### 4.3.3. INRUSH CURRENT

(Cold start – 25 deg. C)

| | |
|---|---|
| 115V | No damage |
| 230V | No damage |

(No damage)

### 4.3.4. INPUT LINE CURRENT

| | |
|---|---|
| 115V | 5.0 Amps – rms maximum |
| 230V | 3.0 Amps – rms maximum |

## 4.4. EFFICIENCY

| | Full load (100%) | Typical load (50%) | Light load (20%) |
|---|---|---|---|
| 115VAC | 80% | 80% | 80% |
| 230VAC | 80% | 80% | 80% |

(loading shown in Amps)

| Loading | +12V1 | +12V2 | +5V | +3.3V | -12V | +5Vsb |
|---|---|---|---|---|---|---|
| Full (100%) | 10.34 | 6.46 | 10.59 | 9.42 | 0.52 | 1.62 |
| Typical (50%) | 5.17 | 3.23 | 5.3 | 4.71 | 0.26 | 0.81 |
| Light (20%) | 2.07 | 1.29 | 2.12 | 1.88 | 0.1 | 0.32 |

## 4.6. PS_ ON#

PS_ON# is an active-low, TTL-compatible signal that allows a motherboard to remotely control the power supply in conjunction with features such as soft on/off, Wake on LAN+, or wake-on-modem. When PS_ON# is pulled to TTL low, the power supply should turn on the five main DC output rails: +12VDC,+5VDC,+3.3VDC,-5VDC,and –12VDC. When PS_ON# is pulled to TTL high or open-circuited, the DC output rails should not deliver current and should be held at zero potential with respect to ground. PS_ON# has no effect on the +5VSB output, which is always enabled whenever

the AC power is present. Table 15 lists PS_ON# signal characteristics.

The power supply shall provide an internal pull-up to TTL high. The power supply shall also provide debounce circuitry on PS_ON# to prevent it from oscillating on/off at startup when activated by a mechanical switch. The DC output enable circuitry must be SELV-compliant.

**Table 15. PS_ON# Signal Characteristics**

| | Min. | Max. |
|---|---|---|
| $V_{IL}$, Input Low Voltage | 0.0V | 0.8V |
| $I_{IL}$, Input Low Current (Vin = 0.4V) | | -1.6mA |
| $V_{IH}$, Input High Voltage (lin = -200 $\mu$ A) | 2.0V | |
| $V_{IH}$ OPEN circuit, lin = 0 | | 5.25V |

## 5. ENVIRONMENTAL REQUIREMENTS

The power supply will be compliant with each item in this specification for the following Environmental conditions.

### 5.1. TEMPERATURE RANGE

| | | |
|---|---|---|
| Operating | 300W | 0 to +25 deg. C |
| Operating | 270W | 0 to +50 deg. C |
| Storage | | -20 to +80 deg. C |

### 5.2. HUMIDITY

| | |
|---|---|
| Operating | 5 –90% RH, Non-condensing |
| Storage | 5 –95% RH, Non-condensing |

### 5.3. VIBRATION

The subject power supply will withstand the following imposed conditions without experiencing non-recoverable failure or deviation from specified output characteristics.

Vibration Operating – Sine wave excited, 0.25 G maximum acceleration, 10-250 Hz swept at one octave / min. Fifteen minute dwell at all resonant points, where resonance is defined as those exciting frequencies at which the device under test experiences excursions two times large than non-resonant excursions.

Plane of vibration to be along three mutually perpendicular axes.

5.4. SHOCK

The subject power supply will withstand the following imposed conditions without experiencing non-recoverable failure or deviation from specified output characteristics.

Storage –40G, 11 mSec. half-sine wave pulse in both directions on three mutually perpendicular axes.
Operating -10G, 11mSec. half-sine wave pulse in both directions on three mutually Perpendicular axes.

**6. SAFETY**

6.1. LEAKAGE CURRENT

The leakage current from AC to safety ground will not exceed 3.5 mA-rms at 264Vac, 50 Hz.

**7. ELECTORMAGNETIC COMPATIBILITY**

7.1 LINE CONDUCTED EMI

The subject power supply will meet FCC and VFG class B requirements under full load conditions.

7.2. RADIATED EMI

The subject power suppy will meet FCC and CISPR 22 requirements under normal load conditions.

**8. LABELLING**

Label marking will be permanent, legible and complied with all agency requirements.

8.1. MODEL NUMBER LABEL

Labels will be affixed to the sides of the power supply showing the following:

- Manufacturer’s name and logo.
- Model no., serial no., revision level, location of manufacturer.
- The total power output and the maximum load for each output.
- AC input rating.

8.2 DC OUTPUT IDENTIFICATION

Each output connector will be labeled.

## 9. RELIABILITY

9.1. MTBF

The power supply have a minimum predicted MTBF(MIL-HDBK-217) of 100,000 hours of continuous operation at 25℃, maximum-output load, and nominal AC input voltage.